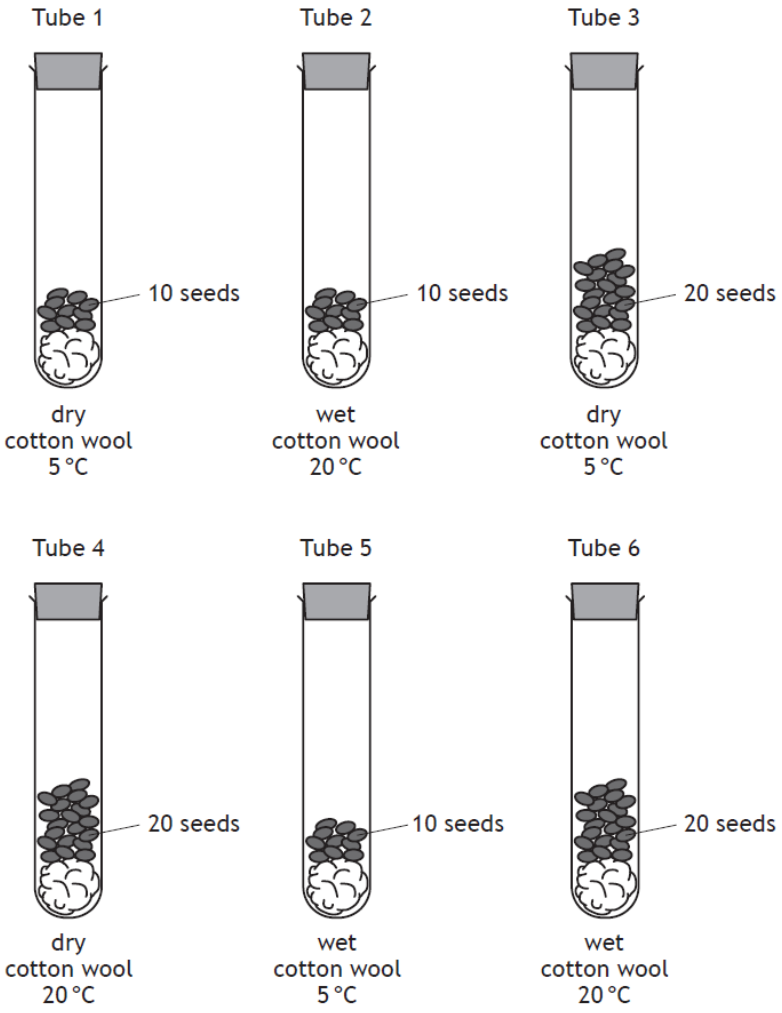
Unit 3 Life on Earth Revision Questions

Key Area 2 Distribution of Organisms

1. The diagrams show an investigation into seed germination.



For a valid conclusion to be drawn, which two tubes should be compared to show the effect of temperature on germination?

A 1 and 3
B 3 and 6
C 2 and 5
D 4 and 6

2. An example of a biotic factor affecting a population of plants is

A a leaf disease reducing the growth of lettuce plants
B acidic soil preventing the growth of daisies
C shade from buildings causing a decrease in the growth of grass
D a cold winter causing a decrease in the growth of geranium plants.

3. Which of the following statements is true of predation?

A It is an abiotic factor and causes a decrease in prey numbers.

B It is an abiotic factor and causes an increase in prey numbers.

C It is a biotic factor and causes a decrease in prey numbers.

D It is a biotic factor and causes an increase in prey numbers.

4. The following paired statement key can be used to identify invertebrate groups.

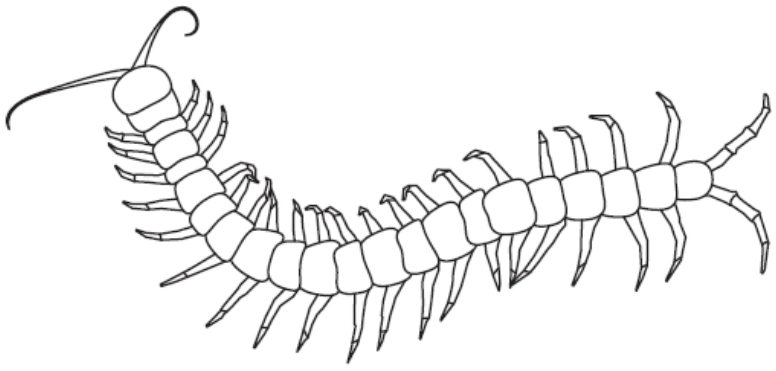
1. Six legs..... *Hexapoda*
   More than six legs..... go to 2

2. 8 legs ..... go to 3
   More than 8 legs ..... go to 4

3. Curved sting ..... *Dromopoda*
   No curved sting ..... *Arachnida*

4. 1 pair of legs per body segment..... *Chilopoda*
   2 pairs of legs per body segment ..... *Diplopoda*

Use the key to identify the invertebrate group to which the following organism belongs.



A Dromopoda

B Arachnida

C Chilopoda

D Diplopoda

5. Which row in the table identifies examples of biotic and abiotic factors?

	Biotic factor	*Abiotic factor*
A	Disease	Rainfall
B	Light intensity	Temperature
C	pH	Soil moisture
D	Predation	Food availability

6. Indicator species can provide information about

A numbers of organisms in a lake

B numbers of predators in a woodland

C levels of light in an ecosystem

D levels of pollution in a river.

7.

The size of a population of snails can be estimated using the following formula.

$$\text{Population} = \frac{\text{Number collected on 1st day} \times \text{Number collected on 2nd day}}{\text{Number of marked individuals found on 2nd day}}$$

A student investigated the population of snails in a garden. He collected 40 snails, marked their shells and released them. Next day, 35 snails were collected and 14 of these were found to be marked.

The snail population was estimated to be

A 16

B 100

C 560

D 1400.

8. Which line in the table below identifies abiotic and biotic factors?

	Abiotic factor	*Biotic factor*
A	light intensity	pH
B	temperature	predation
C	grazing	light intensity
D	predation	grazing

9. Students used a quadrat to estimate the number of buttercups in a field.

They threw the quadrat randomly three times in the area.

In order to improve the reliability of their results they could have

A asked another group of students to check that they had counted correctly

B thrown the quadrat ten times instead of three

C only thrown the quadrat when conditions were at an optimum

D used a smaller quadrat for each of their samples.

10.

The table below compares the rate of extinction of mammal species over two different time periods.

Time period (years)	*Rate of extinction per 100 years*
1500 – 1900	4·5
1900 – 2000	90

The ratio of extinction rates between 1900 – 2000 compared to 1500 – 1900 is

A 1:20

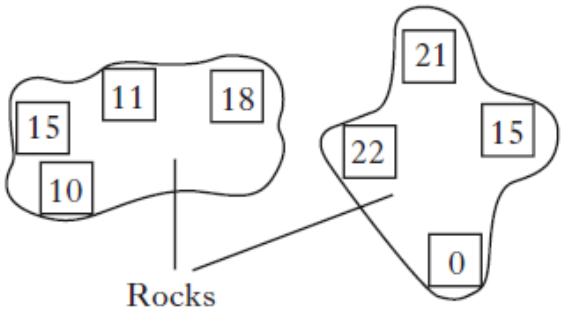
B 1:2

C 2:1

D 20:1.

11. A survey was carried out on the number of mussels attached to rocks on a seashore.

The positions of the mussels are shown by squares in the diagram below. The numbers of mussels at each position are shown in the squares.



What is the average number of mussels found per square?

A 14

B 16

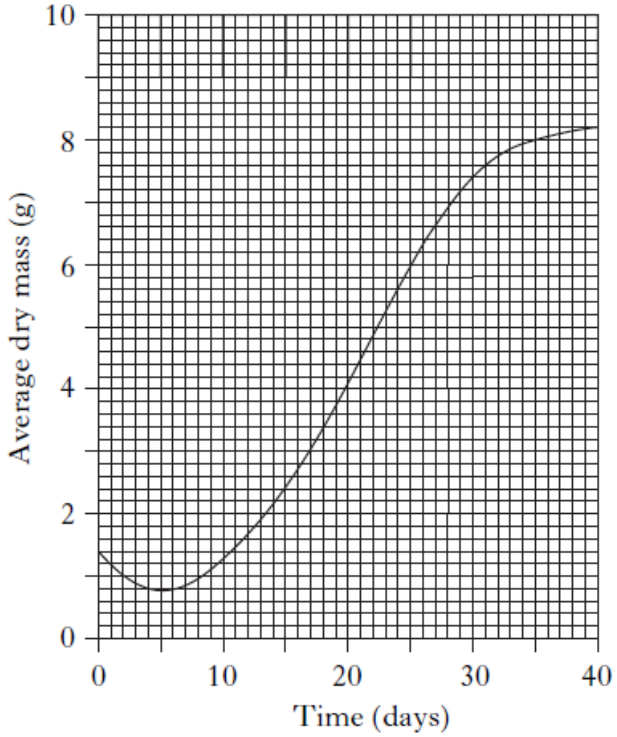
C 56

D 112

12.

An experiment was carried out to investigate the growth of plants for 40 days after germination.

The graph below shows the average dry mass of the plants.



During which 5 day period is there the greatest increase in average dry mass?

A Days 5 – 10

B Days 10 – 15

C Days 20 – 25

D Days 25 – 30

13. The animals present in a sample of leaf litter were counted.

Animals	*Number in sample*
ground beetles	10
woodlice	35
slugs	5
centipedes	10
others	10

What is the percentage of woodlice in the sample?

A 35%

B 50%

C 65%

D 70%

14. The table below shows the relationship between planting density and the mass of seed harvested for a cereal crop trial.

Planting density (number of plants per square metre)	*Mass of seed harvested* (grams per square metre)
4	60
8	86
15	105
32	77
128	21

What is the percentage increase in mass of seed harvested as planting density increases from 4 to 15 plants per square metre?

A 45%

B 75%

C 90%

D 105%

15.

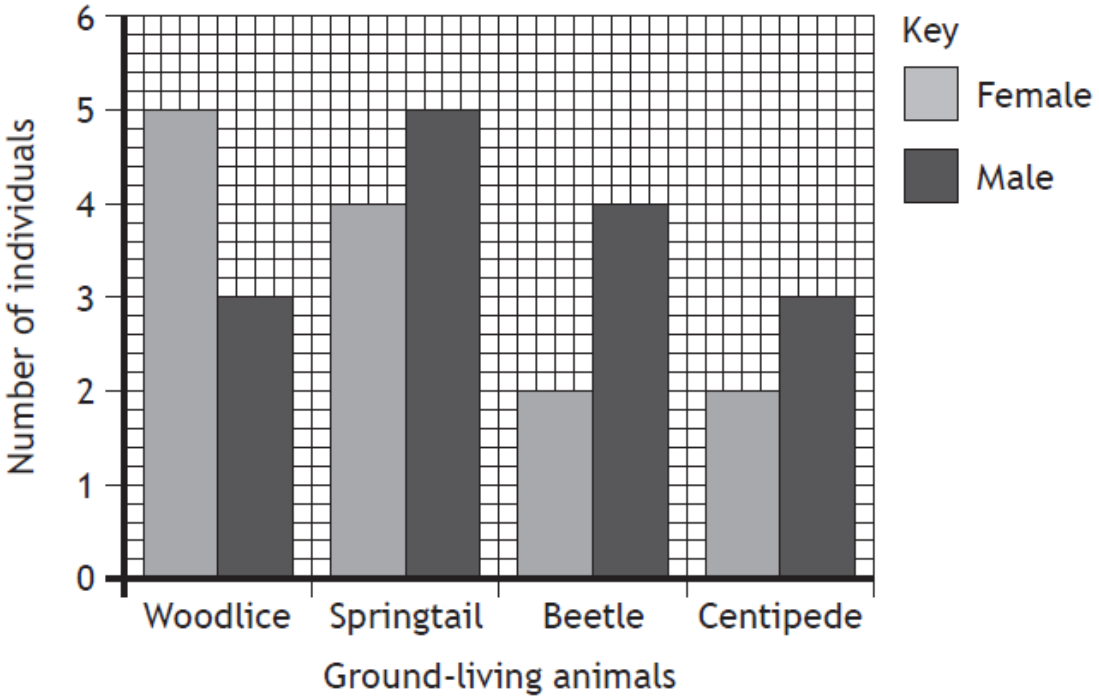
Sampling techniques can be used to estimate the abundance of plants and animals.

(a) In an investigation into ground-living animals in a woodland, a group of students collected and counted the animals they found.

(i) Name a sampling technique which could be used to collect the ground-living animals. 1

_____

(ii) The students sorted the animals into male and female, counted them and recorded the results in a bar graph.



1 Identify the animal which had the greatest overall abundance. 1

_____

2 The students concluded that males were always more abundant than females.

Identify the animal for which this is **not** true. 1

_____

(iii) It was decided that the samples were not fully representative of the area.

Suggest how the investigation could be improved. 1

(b) The distribution of organisms may be affected by abiotic factors.

The table shows the results of a study into the effect of soil moisture levels on the distribution of three species of plant.

		Number of plants		
Sample site	*Soil moisture* (units)	*Species E*	*Species F*	*Species G*
1	20·2	11	15	12
2	23·4	13	14	11
3	22·1	12	16	10
4	24·5	15	17	15
5	26·6	18	13	12
6	28·4	19	15	14

(i) State which species has its distribution most affected by the soil moisture levels. 1

Species _____

(ii) Calculate the average number of plants per sample site for species F. 1

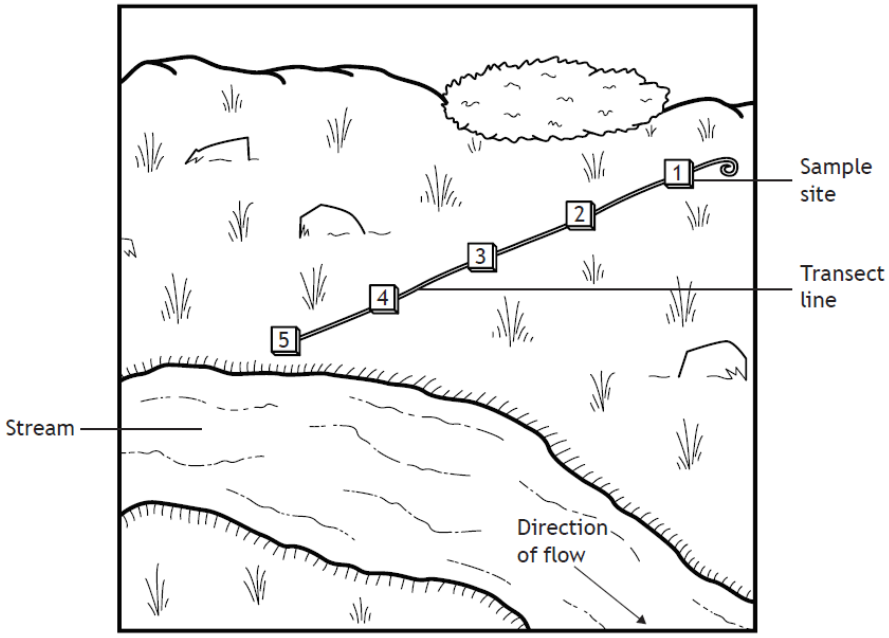
Space for calculation

_____ plants

16. A group of students wanted to investigate the effect of various factors on the distribution of the plant Yellow Iris.

They set up a line transect and marked out 5 evenly spaced sample sites.

The abundance of Yellow Iris was recorded, and values for soil temperature, pH and moisture were measured at the same sample sites.



The results are shown in the table.

Sample site	*Soil temperature* (°C)	*Soil moisture* (% saturation)	*Soil pH*	*Yellow Iris abundance*
1	12	15	5·4	0
2	13	39	5·5	3
3	11	56	5·6	9
4	12	78	5·5	21
5	11	90	5·4	25

(a) Describe the distribution of Yellow Iris along the transect line from sample site 1 to 5. 1

_____

(b) Identify which abiotic factor had the greatest effect on the distribution of Yellow Iris. 1

_____

(c) Probes were used to measure the soil moisture and soil pH.

Describe a precaution that should be taken when using a probe to make sure that the measurements are valid. 1

_____

_____

17. The table shows some features of common seaweeds.

Seaweed	*Colour*	*Shape*	*Bladders*
Bladder wrack	brown	branched	present in pairs
Cladophora	green	long and thin	absent
Spiral wrack	brown	twisted	present in pairs
Channel wrack	brown	grooved edges	absent
Egg wrack	brown	branched	present along its length
Sea lettuce	green	flat	absent
Serrated wrack	brown	saw-toothed edge	absent

(a) Use the information in the table to complete the key. 3

1.	Green seaweed	go to 2
	Brown seaweed	go to 3
2.	Flat	Sea lettuce
		Cladophora
3.	Bladders present	go to 4
	Bladders absent	go to 6
4.	Bladders along its length	
	Bladders in pairs	go to 5
5.	Twisted	Spiral wrack
	Branched	
6.	Grooved edge	Channel wrack
	Saw-toothed edge	Serrated wrack

(b) Describe the difference that would allow a person to identify a piece of seaweed as Egg wrack or Bladder wrack. 1

_____

_____

(c) Identify a feature which Cladophora and Serrated wrack have in common. 1

_____

18.

A group of students carried out a five year investigation into plant growth in an area of abandoned farmland.

They sampled the area using quadrats.

The results are shown in the table below.

	Average abundance of each plant		
Year	*Meadow grass*	*Ragwort*	*Pink campion*
2011	8	15	9
2012	16	14	7
2013	24	12	4
2014	25	8	2
2015	25	5	1

(a) (i) Calculate the average decrease per year in the abundance of ragwort over the five-year period. **1**

Space for calculation

(ii) **Use information from the table** to suggest why the ragwort abundance decreased over the five-year period. **1**

(b) The students also sampled invertebrates such as beetles and spiders.

Name a sampling technique they could have used and describe a possible source of error with this technique. **2**

Sampling technique _____

Source of error _____

_____

(c) The following table gives information about some of the flowering plants found in the area.

Plant	*Height range* (cm)	*Flower colour*	*Flowering period* (months)
Pink Campion	30–90	pink	6
Ragwort	30–200	yellow	6
Meadow Grass	30–70	green	3
Buttercup	5–90	yellow	5

Using the information in the table, complete the three boxes in the paired statement key below. **3**

1. Flower colour is yellow — go to 2

   Flower colour is not yellow — [ ]

2. Height of plant can be over 100 cm — Ragwort

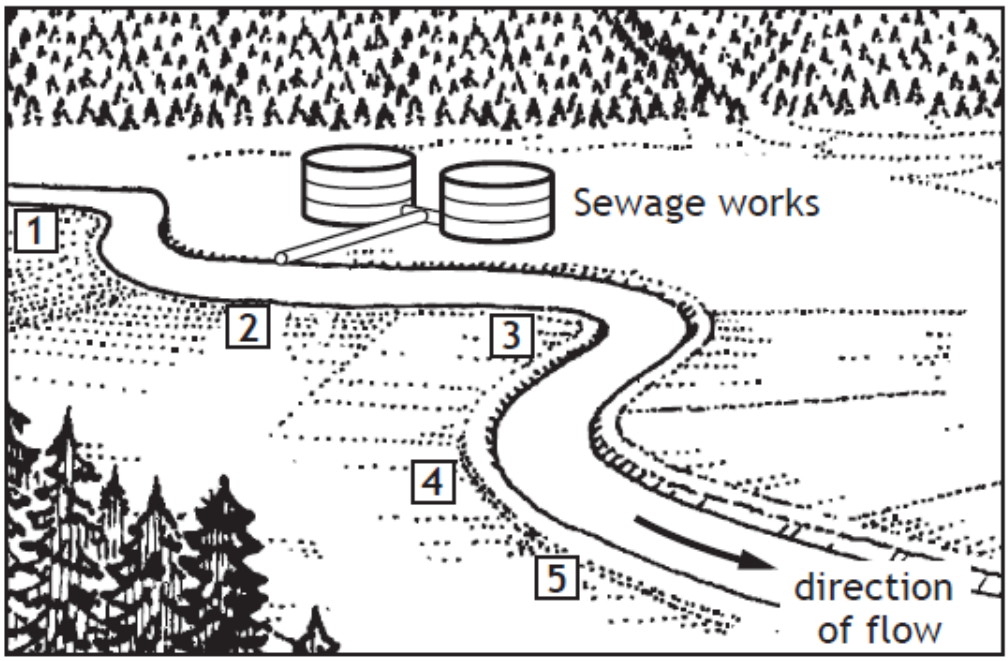
   Height of plant is under 100 cm — [ ]

3. Flowering period lasts only 3 months — Meadow Grass

   Flowering period is longer than 3 months — [ ]

19.

A river was sampled at five sites as shown in the diagram below.



The following tables show the results of analysing the samples at each site.

Table 1

Site	*Oxygen levels* (Units)	*Number of bacteria per 100ml*
1	1·2	500
2	0·04	150 000
3	0·40	12 680
4	0·54	3 400
5	1·12	1 250

Table 2

Organism Present	*Site 1*	*Site 2*	*Site 3*	*Site 4*	*Site 5*
Mayfly nymphs	23	0	0	0	8
Stonefly nymphs	42	0	0	0	21
Caddis fly larvae	18	0	0	10	15
Fresh water shrimp	2	0	0	1	1
Blood worms	1	5	24	7	1
Sludge worms	1	67	43	9	0

(a) (i) Using data from Table 1, describe the relationship between the number of bacteria and the oxygen level in the water. **1**

_____

_____

(ii) Methylene blue is a chemical which can be used to compare oxygen levels in the water. The lower the oxygen level, the faster methylene blue changes from blue to colourless.

A sample of water from each of the five sites was tested.

Predict which sample would lose its blue colour fastest. **1**

Sample from site number _____

(b) Use data from Tables 1 and 2 to answer the following questions.

(i) State which of the organisms in the samples would be found in areas of high oxygen content. **1**

_____

(ii) Sewage in the river is a form of water pollution.

Describe the effect this pollution has on the number of different types of organisms in this river. **1**

_____

_____

(c) Some species are known as indicator species.

Explain what is meant by indicator species. **1**

_____

_____

20.

During a woodland survey, a group of students measured some abiotic factors. Readings they took included the temperature of the soil and the air.

(a) Name one abiotic factor, other than temperature, which they could have measured in the woodland and describe the method of measuring this factor. **2**

Abiotic factor _____

Method _____

_____

_____

(b) (i) During the survey, the students sampled the leaf litter in the woodland using pitfall traps.

However, when they checked the pitfall traps four days after setting them up, the students discovered that they were all empty.

Describe an error the students might have made which would explain why there were no invertebrates in the traps. **1**

_____

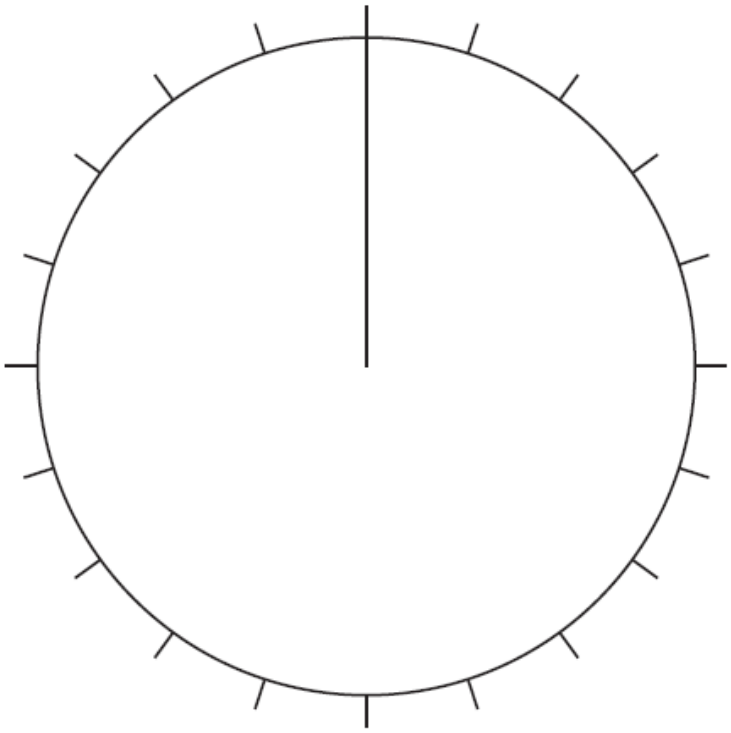
_____

_____

(ii) The error was corrected and the students set out the pitfall traps once again. The table below shows the types of invertebrates and numbers found.

Invertebrates	*Number found*
Woodlice	35
Beetles	20
Slugs	0
Spiders	30
Snails	15

Use the information in the table to complete the pie chart below. 2



(c) The students saw a large number of butterflies in the woodland.

Give a reason why no butterflies were collected with the invertebrates. 1

_____

_____